

Appl. No. : 10/072,201
Amdt. Dated: November 8, 2007
Reply to Examiner's Amendment of August 14, 2007

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AMENDMENTS

To the Claims:

1. (Currently amended) A photosensitive composition for volume hologram recording comprising an organic-inorganic hybrid polymer and/or its hydrolyzed polycondensate and an organometallic compound represented by the following general formula 2, or a partially or fully hydrolyzed polycondensate of said organic-inorganic hybrid polymer and/or its fully partially hydrolyzed polycondensate and said organometallic compound, further a photopolymerization reactive compound and a photopolymerization initiator, wherein said organic-inorganic hybrid polymer is obtainable by copolymerizing at least an [[said]] organometallic compound represented by the following general formula 1 and a monomer having an ethylenically unsaturated bonding:

General formula 1: $R^1_m M^1(OR^2)_n$

wherein M^1 represents a metallic atom, R^1 may be identical or different and represents a group having an ethylenically unsaturated bonding and containing 1-10 carbon atoms, R^2 may be identical or different and is alkyl group containing 1-10 carbon atoms, $m+n$ represents the number of valence of metal M^1 , $m \geq 1$ and $n \geq 1$,

General formula 2: $M^2R^3_n$

wherein M^2 represents a metallic atom, R^3 may be identical or different and is a halogen, an alkyl group, alkoxy group or acyloxy group containing 10 carbon atoms or less respectively or hydroxyl group, all or portion of these groups may be replaced with chelate ligand, and n represents the number of valence of metal M^2 .

2 - 3 (Cancelled)

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4. (Original) A photosensitive composition for volume hologram recording according to claim 1, wherein said composition further comprises a sensitizing pigment.
5. (Previously Presented) A photosensitive composition for volume hologram recording according to claim 1, wherein said photopolymerization reactive compound is a compound having an ethylenically unsaturated bonding capable of performing addition polymerization and said photopolymerization initiator is a free radical polymerization initiator.
6. (Original) A photosensitive composition for volume hologram recording according to claim 1, wherein said photopolymerization reactive compound is a compound capable of performing cationic polymerization and said photopolymerization initiator is a photo-cationic polymerization initiator.
7. (Previously Presented) A photosensitive medium for volume hologram recording, wherein a coating layer of a photosensitive composition for volume hologram recording according to claim 1 is provided on a substrate.
8. (Previously presented) A photosensitive medium for volume hologram recording, wherein a volume hologram recording material layer comprising a hydrolyzed polycondensate of an organic-inorganic hybrid polymer obtainable by copolymerizing at least an organometallic compound represented by the following general formula 1 and a monomer having an ethylenically unsaturated bonding and/or its hydrolyzed polycondensate and an organometallic compound represented by the following general formula 2, a photopolymerization reactive compound, and a photopolymerization initiator is provided on a substrate:

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General formula 1: $R^1_m M^1(OR^2)_n$

wherein M^1 represents a metallic atom, R^1 may be identical or different and represents a group having an ethylenically unsaturated bonding and containing 1-10 carbon atoms, R^2 may be identical or different and is alkyl group containing 1-10 carbon atoms, $m+n$ represents the number of valence of metal M^1 , $m \geq 1$ and $n \geq 1$,

General formula 2: $M^2 R^3 n'$

wherein M^2 represents a metallic atom, R^3 may be identical or different and is a halogen, an alkyl group, an alkoxy group or an acyloxy group containing 10 carbon atoms or less respectively or a hydroxyl group, all or portion of these groups may be replaced with chelate ligand, and n' represents the number of valence of metal M^2 .

9. (Cancelled)

10. (Original) A photosensitive medium for volume hologram recording according to claim 8, wherein said volume hologram recording material layer further comprises a sensitizing pigment.

11. (Previously Presented) A photosensitive medium for volume hologram recording according to claim 8, wherein said photopolymerization reactive compound is a compound having an ethylenically unsaturated bonding capable of performing addition polymerization and said photopolymerization initiator is a free radical polymerization initiator.

12. (Original) A photosensitive medium for volume hologram recording according to claim 8, wherein said photopolymerization reactive compound is a compound capable of

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performing cationic polymerization and said photopolymerization initiator is a photo-cationic polymerization initiator.

13. (Previously presented) A photosensitive composition for volume hologram recording comprising an organic-inorganic hybrid polymer which is obtainable by copolymerizing at least an organic silicon compound represented by the following general formula 3 and a monomer having an ethylenically unsaturated bonding and/or a hydrolyzed polycondensate of said organic-inorganic hybrid polymer, an organometallic particle which has a photopolymerization reactive group and is capable of exhibiting a refractive index different from that of hydrolyzed polycondensate of said organic-inorganic hybrid polymer when said organometallic particle is in a form of a polymer and a photopolymerization initiator:

General formula 3:



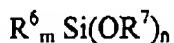
wherein R^4 may be identical or different and is a group having an ethylenically unsaturated bonding and containing 1-10 carbon atoms, R^5 may be identical or different and is an alkyl group containing 1-10 carbon atoms, $m+n=4$, $m \geq 1$ and $n \geq 1$; and

wherein the organometallic particle contains one or more metals selected from the group consisting of Ti, Zr, Zn, In and Sn.

14. (Previously Presented) A photosensitive composition for volume hologram recording according to claim 13, wherein said composition further comprises a second organic silicon compound represented by the following general formula 4:

General formula 4:

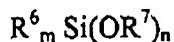
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wherein R^6 may be identical or different and is an alkyl group containing 1-10 carbon atoms, or a hydrocarbon group containing 1-10 carbon atoms and having an alkoxy, a vinyl, an acryloyl, a methacryloyl, an epoxy, an amide, a sulfonyl, a hydroxyl or a carboxyl, R^7 may be identical or different is an alkyl group containing 1-10 carbon atoms, $m+n=4$, $m \geq 1$, and $n \geq 1$.

15. (Currently amended) A photosensitive composition for volume hologram recording according to claim 13, wherein said hydrolyzed polycondensate is a hydrolyzed polycondensate of a second organometallic compound and said organic-inorganic hybrid polymer and/or its hydrolyzed polycondensate ~~combined with a second organometallic compound~~ represented by the following general formula 4:

General formula 4:



wherein R^6 may be identical or different and is an alkyl group containing 1-10 carbon atoms, or a hydrocarbon group containing 1-10 carbon atoms and having an alkoxy, a vinyl, an acryloyl, a methacryloyl, an epoxy, an amide, a sulfonyl, a hydroxyl or a carboxyl, R^7 may be identical or different and is an alkyl group containing 1-10 carbon atoms, $m+n=4$, $m \geq 1$, and $n \geq 1$.

16. (Original) A photosensitive composition for volume hologram recording according to claim 13, wherein said composition further comprises a sensitizing pigment.

17. (Previously Presented) A photosensitive composition for volume hologram recording according to claim 13, wherein said organometallic particle is a compound having an

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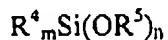
ethylenically unsaturated bonding capable of performing addition polymerization as a photopolymerization reactive group and said photopolymerization initiator is a polymerization initiator.

18. (Original) A photosensitive composition for volume hologram recording according to claim 13, wherein said organometallic particle is a compound having a cationic polymerization group as a photopolymerization reactive group and said photopolymerization initiator is a photo-cationic polymerization initiator.

19. (Previously Presented) A photosensitive medium for volume hologram recording, wherein a coating layer of a photosensitive composition for volume hologram recording according to claim 18 is provided on a substrate.

20. (Previously presented) A photosensitive medium for volume hologram recording, wherein a volume hologram recording material layer comprising a hydrolyzed polycondensate of an organic-inorganic hybrid polymer obtainable by copolymerizing at least an organic silicon compound represented by the following general formula 3 and a monomer having an ethylenically unsaturated bonding, and an organometallic particle which has a photopolymerization reactive group and is capable of exhibiting a refractive index different from that of hydrolyzed polycondensate of said organic-inorganic hybrid polymer when said organometallic particle is in a form of a polymer and a photopolymerization initiator is provided on a substrate:

General formula 3:



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wherein R^4 may be identical or different and is a group having an ethylenically unsaturated bonding and containing 1-10 carbon atoms, R^5 may be identical or different and is an alkyl group containing 1-10 carbon atoms, $m+n=4$, $m \geq 1$ and $n \geq 1$; and

wherein the organometallic particle contains one or more metals selected from the group consisting of Ti, Zr, Zn, In and Sn.

21. (Previously Presented) A photosensitive medium for volume hologram recording according to claim 20, wherein said hydrolyzed polycondensate contained in said volume hologram recording material layer is a hydrolyzed polycondensate of said organic-inorganic hybrid polymer and/or its hydrolyzed polycondensate and a second organic silicon compound represented by the following general formula 4:

General formula 4:

$R^6_n Si(OR^7)_n$

wherein R^6 may be identical or different and is an alkyl group containing 1-10 carbon atoms, or a hydrocarbon group containing 1-10 carbon atoms and having an alkoxy, a vinyl, an acryloyl, a methacryloyl, an epoxy, an amide, a sulfonyl, a hydroxyl or a carboxyl, R^7 may be identical or different and is an alkyl group containing 1-10 carbon atoms, $m+n=4$, $m \geq 1$, and $n \geq 1$.

22. (Original) A photosensitive medium for volume hologram recording according to claim 20, wherein said volume hologram recording material layer further comprises a sensitizing pigment.

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23. (Previously Presented) A photosensitive medium for volume hologram recording according to claim 20, wherein said organometallic particle is a compound having an ethylenically unsaturated bonding capable of performing addition polymerization as a photopolymerization reactive group and said photopolymerization initiator is a free radical polymerization initiator.

24. (Original) A photosensitive medium for volume hologram recording according to claim 20, wherein said organometallic particle is a compound having a cationic polymerization group as a photopolymerization reactive group and said photopolymerization initiator is a photo-cationic polymerization initiator.

25-40 (Cancelled)

41. (Previously Presented) A photosensitive composition for volume hologram recording according to claim 13, wherein the organometallic particle is used at the ratio of 10 to 1000 weight parts with respect to 100 weight parts of the organic-inorganic hybrid polymer and/or the hydrolyzed polycondensate thereof.

42. (Cancelled)

43. (Previously Presented) A photosensitive composition for volume hologram recording according to claim 13, wherein a size of the organometallic particle is in the range of 5 to 100nm.